Claims

[c1]   What is claimed is:

1.A device for decoding a disc read signal generated by accessing data stored in a disc storage medium, the device comprising:

a multi-level analog-to-digital converter (ADC) for digitizing the disc read signal to generate a digitized disc read signal;

a confidence index generating circuit for generating a plurality of confidence indexes according to the magnitude of the digitalized disc read signal;

a demodulator coupled to the multi-level ADC for demodulating the digitalized disc read signal to generate a demodulated disc read signal; and

an Error Correction Code (ECC) decoder coupled to the demodulator for decoding the demodulated disc read signal according to the confidence indexes.

[c2]   2.The device of claim 1, wherein the confidence indexes is generated according to the statistical distribution of a plurality of digitized disc read signal such that the confidence indexes is for indicating the reliability of the disc read signal.

[c3] 3.The device of claim 2, wherein the confidence indexes is generated through comparing the number of the digitized disc read signal whose magnitude fall within a predetermined range with a predetermined threshold.

[c4] 4. The device of claim 1, wherein the device further comprises a confidence index table for storing the confidence indexes.

[c5] 5. The device of claim 1, wherein each of the confidence indexes is correspondent to a word, a row, or an ECC block.

[c6] 6. The device of claim 1, wherein the demodulator is further for updating the confidence index table according to the demodulation result.

[c7] 7. The device of claim 1, wherein the device further comprises a Run Length Limited (RLL) protection circuit for performing RLL correction on the digitized disc read signal.

[c8] 8. The device of claim 7, wherein the Run Length Limited (RLL) protection circuit is further for updating the confidence index table according to the RLL correction result.

[c9] 9. The device of claim 7, wherein the RLL protection circuit updates the confidence index table through out-

putting a RLL detection signal, wherein the magnitude of the RLL detection signal corresponds to the inverse proportion of the difference between the magnitude of an error bit of the digitalized disc read signal and a DC level of the digitalized disc read signal.

[c10]   10. The device of claim 1, wherein the ECC decoder perform Reed–Solomon Product Code (RSPC) decoding operation to decode the demodulated disc read signal.

[c11]   11. The device of claim 1, wherein the ECC decoder further comprises an erasure table for generating an erasure information according to the confidence indexes.

[c12]   12. The device of claim 11, wherein the ECC decoder decodes the demodulated disc read signal according to the erasure information stored in the erasure table.

[c13]   13. The device of claim 1, wherein the confidence index generating circuit is further for generating an erasure information according to the confidence indexes, wherein the erasure information at least indicate the location and the number of the erasure.

[c14]   14. The device of claim 13, wherein the device further comprises an erasure table for storing the erasure information.

[c15]   15. The device of claim 14, wherein the demodulator is further for updating the erasure table according to the demodulation result.

[c16]   16. The device of claim 14, wherein the device further comprises a Run Length Limited (RLL) protection circuit for performing RLL correction on the digitized disc read signal and the Run Length Limited (RLL) protection circuit is further for updating the erasure table according to the RLL correction result.

[c17]   17. The device of claim 16, wherein the RLL protection circuit updates the erasure table through outputting a RLL detection signal, wherein the magnitude of the RLL detection signal corresponds to the inverse proportion of the difference between the magnitude of an error bit of the digitalized disc read signal and a DC level of the digitalized disc read signal.

[c18]   18. The device of claim 14, wherein the device further comprises an erasure locator polynomial generator for generating a erasure locator polynomial generator according to the erasure information.

[c19]   19. The device of claim 18, wherein the ECC decoder decodes the demodulated disc read signal according to the erasure locator polynomial.

[c20]   20. The device of claim 1, wherein the optical storage medium is a Digital Versatile Disc (DVD).

[c21]   21.A method for decoding a disc read signal generated by accessing data stored in a disc storage medium, the method comprising:
digitizing the disc read signal to generate a multi-level digitized disc read signal;
generating a plurality of confidence indexes according to the magnitude of the digitalized disc read signal;
demodulating the digitalized disc read signal to generate a demodulated disc read signal; and
decoding the demodulated disc read signal according to the confidence indexes.

[c22]   22.The method of claim 21, wherein the confidence indexes is generated according to the statistical distribution of a plurality of digitized disc read signal such that the confidence indexes is for indicating the reliability of the disc read signal.

[c23]   23.The method of claim 22, wherein the confidence indexes is generated through comparing the number of the digitized disc read signal whose magnitude fall within a predetermined range with a predetermined threshold.

[c24]   24. The method of claim 21, wherein the method further comprises a step of storing the confidence indexes.

[c25]   25. The method of claim 21, wherein each of the confidence indexes is correspondent to a word, a row, or an ECC block.

[c26]   26. The method of claim 21, wherein the method further comprises a step of updating the confidence indexes according to the demodulation result.

[c27]   27. The method of claim 21, wherein the method further comprises a step of performing RLL correction on the digitized disc read signal and updating the confidence indexes according to the RLL correction result.

[c28]   28. The method of claim 21, wherein the step of decoding the demodulated disc read signal ECC decoder is executed through performing Reed-Solomon Product Code (RSPC) decoding operation.

[c29]   29. The method of claim 21, wherein the method further comprises steps of generating an erasure information according to the confidence indexes and decoding the demodulated disc read signal according to the erasure information.

[c30]   30. The method of claim 21, wherein the method further

comprises a step of generating an erasure information according to the confidence indexes, wherein the erasure information at least indicate the location and the number of the erasure.

[c31]   31. The method of claim 30, wherein the method further comprises a step of updating the erasure information according to the demodulation result.

[c32]   32. The method of claim 30, wherein the method further comprises steps of performing RLL correction on the digitized disc read signal and updating the erasure information according to the RLL correction result.

[c33]   33. The method of claim 30, wherein the method further comprises steps of generating a erasure locator polynomial generator according to the erasure information and decoding the demodulated disc read signal according to the erasure locator polynomial.

[c34]   34. The method of claim 21, wherein the optical storage medium is a Digital Versatile Disc (DVD).